XFP-CWDM-LL-40KM

10Gb/s 40km DWDM XFP Optical Transceiver

PRODUCT FEATURES



- Hot-pluggable XFP footprint
- Supports 9.95Gb/s to 11.3Gb/s bit rates
- Supports Line-side and XFI loopback
- RoHS-6 Compliant (lead-free)
- Power dissipation <2.5W
- 3.3V &1.8V power supply
- Maximum link length of 40km
- Cooled DWDM EML and PIN Receiver
- Full Duplex LC connector
- No Reference Clock required
- Built-in digital diagnostic functions
- Standard bail release mechanism
- Case operating temperature range: Commercial: 0°C to +70°C

  Industrial: -40°C to +85°

APPLICATIONS

- 10GBASE-ER/EW 10G Ethernet
- 40KM 10G Fiber Channel
- SONET OC-192 &SDH STM 64

PRODUCT DESCRIPTION

XFP-CWDM-LL-40KM Small Form Factor 10G (XFP) transceivers are compliant with the current XFP Multi-Source Agreement (MSA) Specification. They comply with 10-Gigabit Ethernet 10GBASE-ER/EW per IEEE 802.3ae. Digital diagnostics functions are available via a 2-wire serial interface, as specified in the XFP MSA. The transceiver is RoHS compliant and leads free.

I. Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit	NOTE
Absolute Supply Voltage	Vcc3	-0.3		3.6	V	
	Vcc2	-0.3		2.0	V	
Storage Temperature	TS	-40		85	°C	
Case Operating Temperature	Tcase	0		70	°C	
		-40	-	85	ºC	
Operating Relative Humidity	RHop	5		95	%	

II. Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	NOTE
Supply Voltage – 1.8V supply	Vcc2	1.71		1.89	V	
Supply Voltage – 3.3V supply	Vcc3	3.13		3.47	V	
Supply Current – 1.8V supply	Icc2			180	mA	
Supply Current – 3.3V supply	Icc3			640	mA	
Module total power	P			2.5	W	1
Transmitter						
Input differential impedance	R_{in}		100		Ω	2
Differential data input swing	Vin,pp	120		820	mV	
Transmit Disable Voltage	V_D	2.0		Vcc	V	3
Transmit Enable Voltage	V_{EN}	GND		GND+ 0.8	V	
Receiver						
Differential data output swing	Vout,pp	340	650	850	mV	4
LOS Fault	$V_{LOS\ fault}$	Vcc – 0.5		V_{CCHOST}	V	5
LOS Normal	$V_{LOS\ norm}$	GND		GND+0.5	V	5

Notes:

1. Maximum total power value is specified across the full temperature and voltage range.
2. After internal AC coupling.
3. Or open circuit.
4. Into 100 ohms differential termination.
5. Loss Of Signal is open collector to be pulled up with a 4.7k – 10kohm resistor to 3.15 – 3.6V. Logic 0 indicates normal operation; logic 1 indicates no signal detected.

Ⅲ. Optical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	NOTE
Transmitter						
Average Optical Power	P_f	-1		4	dBm	
Optical Wavelength	λc	λc -0.1		λc +0.1	nm	
Center Wavelength Spacing			50		GHz	1
Side mode Suppression ratio	SMSR	30			dB	
Optical Extinction Ratio	ER	8.2			dB	
Average Launch power of OFF transmitter	P_{OFF}			-30	dBm	
Tx Jitter	Tx_j	Compliant with 802.3ae requirements				
Receiver						
Receiver Sensitivity	Psen			-16.5	dBm	2
Input Saturation Power (Overload)	Psat	+0.5			dBm	
Wavelength Range	λ_C	1260		1600	nm	
Receiver Reflectance	R_{rx}			-27	dB	
LOS De-Assert	LOS_D			-18	dBm	
LOS Assert	LOS_A	-32			dBm	
LOS Hysteresis		0.5			dB	

Notes:

1. Corresponds to approximately 0.4 nm.
2. Measured with BER<10^{-12} @10.3Gbps, $2^{31}-1$ PRBS.

Ⅳ. Pin Assignment

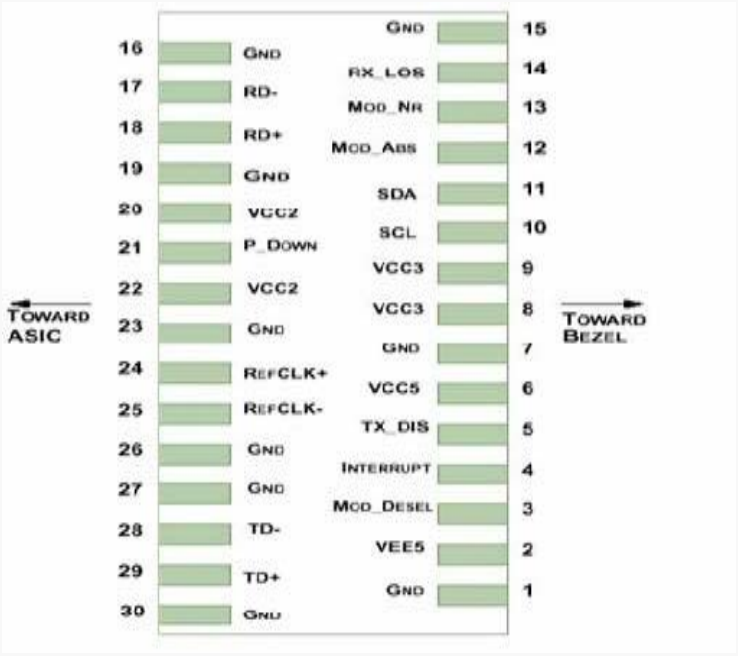


Diagram of Host Board Connector Block Pin Numbers and Name

Pin	Logic	Symbol	Name/Description	NOTE
1		GND	Module Ground	1
2		VEE5	Optional -5.2 Power Supply – Not required	
3	LVTTL-I	Mod-Desel	Module De-select; When held low allows the module to respond to 2-wire serial interface commands	
4	LVTTL-O	Interrupt	Interrupt (bar); Indicates presence of an important condition which can be read over the serial 2-wire interface	2
5	LVTTL-I	TX_DIS	Transmitter Disable; Transmitter laser source turned off	
6		VCC5	+5 Power Supply– Not required	
7		GND	Module Ground	1
8		VCC3	+3.3V Power Supply	
9		VCC3	+3.3V Power Supply	
10	LVTTL-I	SCL	Serial 2-wire interface clock	2
11	LVTTLI/O	SDA	Serial 2-wire interface data line	2
12	LVTTL-O	Mod_Abs	Module Absent; Indicates module is not present. Grounded in the module.	2
13	LVTTL-O	Mod_NR	Module Not Ready; LONGLINE defines it as a logical OR between RX_LOS and Loss of Lock in TX/RX.	2
14	LVTTL-O	RX_LOS	Receiver Loss of Signal indicator	2
15		GND	Module Ground	1
16		GND	Module Ground	1
17	CML-O	RD-	Receiver inverted data output	
18	CML-O	RD+	Receiver non-inverted data output	
19		GND	Module Ground	1
20		VCC2	+1.8V Power Supply	
21	LVTTL-I	P_Down/RST	Power Down; When high, places the module in the low power stand-by mode and on the falling edge of P_Down initiates a module reset	
			Reset; The falling edge initiates a complete reset of the module including the 2-wire serial interface, equivalent to a power cycle.	
22		VCC2	+1.8V Power Supply	
23		GND	Module Ground	1
24	PECL-I	RefCLK+	Reference Clock non-inverted input, AC coupled on the host board – Not required	3
25	PECL-I	RefCLK-	Reference Clock inverted input, AC coupled on the host board – Not required	3
26		GND	Module Ground	1
27		GND	Module Ground	1
28	CML-I	TD-	Transmitter inverted data input	
29	CML-I	TD+	Transmitter non-inverted data input	
30		GND	Module Ground	1

Notes:

1. Module circuit ground is isolated from module chassis ground within the module
2. Open collector; should be pulled up with 4.7k – 10kohms on host board to a voltage between 3.15V and 3.6V.
3. A Reference Clock input is not required by the XFP-CWDM-LL-40KM. If present, it will be ignored.

V. General Specifications

Parameter	Symbol	Min	Typ	Max	Units	NOTE
Bit Rate	BR	9.95		11.3	Gb/s	1
Bit Error Ratio	BER			10^{-12}		2
Max. Supported Link Length	LMAX			40	km	1

Notes:

1. 10GBASE-ER/EW.
2. Tested with 10.3Gbps, $2^{31} - 1$ PRBS

VI. Digital Diagnostic Functions

As defined by the XFP MSA, LONGLINE XFP transceivers provide digital diagnostic functions via a 2-wire serial interface, which allows real-time access to the following operating parameters:

- Transceiver temperature
- Laser bias current
- Transmitted optical power
- Received optical power
- Transceiver supply voltage

It also provides a sophisticated system of alarm and warning flags, which may be used to alert end-users when particular operating parameters are outside of a factory-set normal range.

The operating and diagnostics information is monitored and reported by a Digital Diagnostics Transceiver Controller (DDTC) inside the transceiver, which is accessed through the 2-wire serial interface. When the serial protocol is activated, the serial clock signal (SCL pin) is generated by the host. The positive edge clocks data into the XFP transceiver into those segments of its memory map that are not write-protected. The negative edge clocks data from the XFP transceiver. The serial data signal (SDA pin) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially. The 2-wire serial interface provides sequential or random access to the 8 bit parameters, addressed from 000h to the maximum address of the memory.
For more detailed information including memory map definitions, please see the XFP MSA Specification.

VII. XFP-CWDM-LL-40KM center wavelength

C-band λc Wavelength Guide Pin Descriptions

Channel	Wavelength (nm)	Frequency(THZ)	Channel	Wavelength (nm)	Frequency (THZ)
C17	1563.86	191.70	**C39**	1546.12	193.90
H17	1563.45	191.75	**H39**	1545.72	193.95
C18	1563.05	191.80	**C40**	1545.32	194.00
H18	1562.64	191.85	**H40**	1544.92	194.05
C19	1562.23	191.90	**C41**	1544.53	194.10
H19	1561.83	191.95	**H41**	1544.13	194.15
C20	1561.42	192.00	**C42**	1543.73	194.20
H20	1561.01	192.05	**H42**	1543.33	194.25
C21	1560.61	192.10	**C43**	1542.94	194.30
H21	1560.20	192.15	**H43**	1542.54	194.35
C22	1559.79	192.20	**C44**	1542.14	194.40
H22	1559.39	192.25	**H44**	1541.75	194.45
C23	1558.98	192.30	**C45**	1541.35	194.50
H23	1558.58	192.35	**H45**	1540.95	194.55
Giga **C24**	1558.17	192.40	**C46**	1540.56	194.60
H24	1557.77	192.45	**H46**	1540.16	194.65
C25	1557.36	192.50	**C47**	1539.77	194.70
H25	1556.96	192.55	**H47**	1539.37	194.75
C26	1556.55	192.60	**C48**	1538.98	194.80
H26	1556.15	192.65	**H48**	1538.58	194.85
C27	1555.75	192.70	**C49**	1538.19	194.90
H27	1555.34	192.75	**H49**	1537.79	194.95
C28	1554.94	192.80	**C50**	1537.40	195.00
H28	1554.54	192.85	**H50**	1537.00	195.05
C29	1554.13	192.90	**C51**	1536.61	195.10
H29	1553.73	192.95	**H51**	1536.22	195.15
C30	1553.33	193.00	**C52**	1535.82	195.20
H30	1552.93	193.05	**H52**	1535.43	195.25
C31	1552.52	193.10	**C53**	1535.04	195.30
H31	1552.12	193.15	**H53**	1534.64	195.35
C32	1551.72	193.20	**C54**	1534.25	195.40
H32	1551.32	193.25	**H54**	1533.86	195.45
C33	1550.92	193.30	**C55**	1533.47	195.50
H33	1550.52	193.35	**H55**	1533.07	195.55
C34	1550.12	193.40	**C56**	1532.68	195.60
H34	1549.72	193.45	**H56**	1532.29	195.65
C35	1549.32	193.50	**C57**	1531.90	195.70
H35	1548.91	193.55	**H57**	1531.51	195.75
C36	1548.51	193.60	**C58**	1531.12	195.80
H36	1548.11	193.65	**H58**	1530.72	195.85
C37	1547.72	193.70	**C59**	1530.33	195.90
H37	1547.32	193.75	**H59**	1529.94	195.95
C38	1546.92	193.80	**C60**	1529.55	196.00
H38	1546.52	193.85	**H60**	1529.16	196.05
Non-ITU	**Peak wavelength between 1528.77nm-1563.86**		**C61**	1528.77	196.10